REMARKS

Claim Rejections under 35 U.S.C. § 101

Claims 48-59 were rejected under 35 U.S.C. § 101 because they recite a mathematical algorithm per se without a required practical application. Applicants respectfully disagree. Independent claim 48 is directed to a computer-readable medium comprising a data storage device and computer-executable program code stored on the data storage device. Thus, claim 48 is directed to a new and useful "manufacture" under 35 U.S.C. § 101, not a "process" that solves a mathematical problem or manipulates abstract ideas or concepts.

To clarify these claims, claim 48 has been amended to recite that the computer-executable code "operates on a computer." A computer-readable medium with computer-executable code stored thereon is a computer element which defines structural and functional interrelationships between the computer-executable code and the rest of the computer which permit the computer-executable code's functionality to be realized, and thus is statutory.[1]

Applicants respectfully request withdrawal of the rejection and allowance of claims 48-59.

Claim Rejections under 35 U.S.C. § 103(a)

In the Office Action mailed May 27, 2008, claims 1-59 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ma et al. (U.S. Patent App. Pub. No. 2003/0236460 A1) in view of Miller et al. (U.S. 6,669,638 B1).

Claim 46 has been amended for clarification.

Applicants respectfully request reconsideration of the rejections of pending claims 1-59, including independent claims 1, 28, 39, 46, and 48.

Independent claims 1 and 48 recite, *inter alia*, generating transmit pulses at a predetermined voltage level for the first imaging mode; and generating transmit pulses at the predetermined voltage level for the second imaging mode, with a duty cycle selected in response to one or more of: a restriction on surface temperature of a transducer, and a restriction on transducer power output.

[1] See, Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility, Annex VI, Section (a), page 53, first full paragraph (October 26, 2005).

Ma, et al. do not disclose these features. Ma, et al. teach reducing elevation fold-in artifacts by combining Doppler and B-mode image signals using a modulated, non-linear function (abstract). Ma, et al. are silent regarding voltage levels for acquiring the Doppler and B-mode image signals. Specifically, Ma, et al. do not teach or suggest generating transmit pulses at *the* predetermined voltage level for the second imaging mode, where the predetermined voltage level is also a predetermined voltage level for the first imaging mode.

Additionally, Ma, et al. do not teach or suggest a duty cycle selected in response to one or more of: a restriction on surface temperature of a transducer, and a restriction on transducer power output (Office Action filed 5/27/08, page 3, second paragraph). Miller, et al. also do not disclose these features. Miller, et al. teach controlling the heat of an ultrasonic transducer by cycling rapidly between a higher power imaging mode and a lower power imaging mode and combining the results to form a single image (abstract). Miller, et al. teach a power supply under control of a controller that controls the amount of power sent to an ultrasonic transducer (col. 8:10-13). Miller, et al. reduce a transmit voltage when a system is in a fundamental imaging mode and switches back to an original transmit voltage when the system is ready to be reset (col. 9:63 – 10:2; Fig. 6).

Miller, et al. do not teach or suggest generating transmit pulses at *the* predetermined voltage level for the second imaging mode, where the predetermined voltage level is also a predetermined voltage level for the first imaging mode. Instead, Miller, et al. *reduce* voltage levels between different imaging modes.

Independent claim 28 recites, *inter alia*, generating a first pulse train for a first mode of operation at a fixed voltage level selected in response to a restriction on surface temperature of a transducer; and generating a second pulse train for a second mode of operation substantially at the fixed voltage level, wherein the second mode of operation is different from the first mode of operation.

Ma, et al. do not disclose these features. Ma, et al. are silent regarding voltage levels for acquiring the Doppler and B-mode image signals. Specifically, Ma, et al. do not teach or suggest generating a second pulse train for a second mode of operation

substantially at *the* fixed voltage level, where the fixed voltage level is also a fixed voltage level for the first mode of operation.

Additionally, Ma, et al. do not teach or suggest selecting a fixed voltage level in response to a restriction on surface temperature of a transducer. Ma, et al. are silent regarding voltage levels.

Miller, et al. also do not disclose these features. Specifically, Miller, et al. do not teach or suggest generating a second pulse train for a second mode of operation substantially at *the* fixed voltage level, where the fixed voltage level is also a fixed voltage level for the first mode of operation. Instead, Miller, et al. *reduce* voltage levels between different imaging modes.

Additionally, Miller, et al. do not teach or suggest selecting a fixed voltage level in response to a restriction on surface temperature of a transducer. Instead, Miller, et al. teach *changing* voltage based on surface temperature (col. 9:63 – 10:2; Fig. 6).

Independent claim 39 recites, *inter alia*, a power supply coupled to the transducer and operable to supply a fixed voltage level to the transducer for both the first and second pulse trains; where the fixed voltage level is selected in response to one or more of: a restriction on surface temperature of the transducer, and a restriction on transducer power output.

Ma, et al. do not disclose these features. Ma, et al. are silent regarding power supplies.

Additionally, Ma, et al. do not teach or suggest selecting a fixed voltage level in response to a restriction on surface temperature of a transducer. Ma, et al. are silent regarding voltage levels.

Miller, et al. also do not disclose these features. Specifically, Miller, et al. do not teach or suggest a power supply coupled to the transducer and operable to supply a fixed voltage level to the transducer for both the first and second pulse trains. Instead, Miller, et al. *reduce* voltage levels between different imaging modes.

Additionally, Miller, et al. do not teach or suggest selecting a fixed voltage level in response to a restriction on surface temperature of a transducer. Instead, Miller, et al. teach *changing* voltage based on surface temperature (col. 9:63 – 10:2; Fig. 6).

Independent claim 46 recites, *inter alia*, the number Nm of operating modes is greater than the number Np of fixed-voltage power sources.
Ma, et al. do not disclose this feature. Ma, et al. are silent regarding power sources, fixed voltage or otherwise.

Miller, et al. also do not disclose this feature. Miller, et al. teach a power supply under control of a controller that controls the amount of power sent to an ultrasonic transducer (col. 8:10-13). Miller, et al. reduce a transmit voltage when a system is in a fundamental imaging mode and switches back to an original transmit voltage when the system is ready to be reset (col. 9:63 – 10:2; Fig. 6). However, Miller, et al. are silent regarding whether the power supply is a fixed-voltage power source.

Dependent claims 2-27, 29-38, 40-45, 47, and 49-59 each depend from one of the above independent claims and are allowable for at least the same reasons as their respective base claim. Further features patentably distinguish from Ma, et al., Miller, et al., and combinations thereof. Examples are provided below.

Claims 2 and 49 recite generating transmit pulses at the predetermined voltage level for the first imaging mode comprises on-off switching of a single DC voltage supply. Miller, et al. teach power circuits that stop providing power to an ultrasonic transducer, however, Miller, et al. go on to say that these systems are inappropriate for ultrasonic imaging applications (col. 6:8-15).

Claims 4 and 50 recite the second imaging mode is a Doppler-spectral ultrasound imaging mode. Ma, et al. and Miller, et al. teach Doppler color-flow imaging (Ma [0005]; Miller 4:32-40), however, Doppler color-flow imaging is not Doppler-*spectral* imaging (see, [0004]-[0005] of the publication of the present application, U.S. Pat. App. Pub. No. 2005/0228282).

Claims 7-20, 26-27, and 54-55 recite specific values and/or ranges that are not disclosed or suggested in Ma, et al., Miller, et al., or a combination of the two.
Claims 21-22, 33-34, 41, 47, and 56 recite unipolar and/or bipolar pulses that are not disclosed or suggested in Ma, et al., Miller, et al., or a combination of the two.
Claims 23 and 57 recite using one or more switches to engage or disengage the voltage supply that is not disclosed or suggested in Ma, et al., Miller, et al., or a combination of the two.

Claims 35-37, 44-45 recite specific transmit cycles that are not disclosed or suggested in Ma, et al., Miller, et al., or a combination of the two.
Claim 38 recites filtering the received pulse train with a lower center frequency than a center frequency of the transmit pulse train that is not disclosed or suggested in Ma, et al., Miller, et al., or a combination of the two.

CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call Craig Summerfield at (312) 321-4726.

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